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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/960,517	09/24/2001	Hitoshi Aoki	900-400	7216

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EXAMINER

THOMAS, TONIAE M

ART UNIT PAPER NUMBER

2822

9

DATE MAILED: 03/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/960,517

Applicant(s)

AOKI, HITOSHI

Examiner

Toniae M. Thomas

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— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 January 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 and 18-21 is/are pending in the application.
- 4a) Of the above claim(s) 19 and 21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12, 18 and 20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

### **DETAILED ACTION**

1. This action is in response to the election filed on 10 January 2003. Currently, claims 1-12 and 18-21 are pending.

### ***Election/Restrictions***

2. Applicant's election without traverse of Group I (claims 1-12, 18, 20) in Paper No. 8 is acknowledged. Claims 19 and 21 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-7, 10-12, 18, and 20 are rejected under 35 U. S. C. 102(e) as being anticipated by Su et al. (US 6,133,096).

As discussed in the Office action mailed on 05 July 2002, Su et al. disclose a semiconductor device (see figs. 5, 6, 7B, 8-12 and accompanying text). The semiconductor device comprises the following elements: a semiconductor substrate 1 of

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a first conductivity type; a first electrode 7b on the substrate with an intervening gate insulation film 6; a second electrode 10 on the first electrode with an intervening intermediate insulation film 9; and a pair of impurity regions of a second conductivity type, the impurity regions comprising a low concentration impurity region 17, an intermediate concentration impurity region 20, and a high concentration impurity region 23. The impurity regions are sequentially arranged in this order from a region located underneath at least one of the first and second electrodes along a horizontal direction of the substrate (fig. 12). The high concentration impurity region is laterally offset from and laterally spaced from the low concentration impurity region in at least one impurity region (fig. 12)

Silicide film 11 is provided on the second electrode (fig. 8), and silicide film 24 is provided on the high concentration impurity region 23 (fig. 12).

Sidewall insulation films 21 are provided on the sidewalls of the first and second electrodes (fig. 11).

The intermediate concentration impurity region 20 extends from the surface portion of the substrate to the inside of the substrate surrounding the high concentration impurity region (fig. 11).

The low concentration impurity region 17 and the intermediate concentration impurity region 20 surround the high concentration impurity region 23 (fig. 11).

Forming the first electrode 7b such that it has a greater thickness than the second electrode 10 is taught (col. 4, lines 25-28, 55-57).

The second electrode 10 entirely covers the first electrode 7b (fig. 5).

The first electrode 7b serves as a floating gate of a memory device, and the second electrode 10 serves as a control gate of the memory device (col. 4, lines 38-40 and col. 5, lines 25-27).

The second electrode 10 is a gate electrode and extends laterally beyond an edge of the first electrode 7b (fig. 5).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. *Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Su et al.*

Su et al. do not teach the claimed concentration and depth for the low, intermediate, and high concentration impurity regions. However, given the general process disclosed in the prior art, it would have been within the ability of one having ordinary skill in the art to discover the claimed impurity concentration and depth for the low, intermediate, and high concentration impurity regions through routine experimentation. "Where general conditions of [a] claim are disclosed in prior art, it is not inventive to discover optimum or workable ranges by routine experimentation" (see *In re Aller* 105 USPQ 233 (CCPA 1955)). Therefore, the impurity concentration and

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depth for the low, intermediate, and high concentration impurity regions is taken to be obvious over Su et al.

### ***Response to Arguments***

5. Applicant's arguments filed 10 January 2003 have been fully considered but they are not persuasive.

Regarding claim 1, the Applicant contends that Su et al. fail to disclose or suggest that the high concentration impurity region is (a) laterally offset from and (b) laterally spaced from the low concentration impurity region in at least one impurity region.

(a) Webster's Dictionary gives the following definitions for *lateral* and *offset*: *lateral* - of, pertaining to, or located at or on the side; *offset* - something deriving from, but set off from something else. In light of these definitions, it is the examiner's position that the high impurity region 23 is laterally offset from the low concentration impurity region 17 because, as fig. 11 shows, the high concentration impurity region derives from the low concentration impurity region and is offset from the side of the low concentration impurity region that extends in a direction parallel to the top surface of the substrate.

(b) As shown in fig. 11, the high impurity region 23 is self-aligned with the sidewall spacer 21. As a result, the high impurity region is laterally spaced from the low concentration impurity region 17 by a distance equal to the width of the spacer.

Regarding claim 20, the Applicant contends that Su et al. do not disclose or suggest "a low concentration impurity region, an intermediate concentration impurity

region, and a high concentration impurity region sequentially arranged in this order from a region located underneath at least one of the first and second electrodes *along a horizontal direction* of the semiconductor substrate.”

As shown in fig. 11, the low concentration impurity region 17, the intermediate concentration impurity region 20, and the high concentration impurity region 23 are sequentially arranged in the claimed order. It is the examiner’s position that the three impurity regions are arranged in sequence from a region located underneath at least one of the first and second electrodes along a horizontal direction of the substrate because, the impurity regions are formed in a region of the substrate, and the substrate is underneath the first and second electrodes.

Claims 19 and 21 have been withdrawn from further consideration, as discussed in Section 2 of this action. Therefore, the arguments filed on 10 January 2003 regarding claims 19 and 21 are moot.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

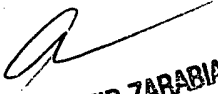
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (703) 305-7646. The examiner can normally be reached on Monday through Thursday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (703) 308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

*JMJ*

March 19, 2003

  
AMIR ZARABIAN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800